

The Directed Shark Drift Gillnet Fishery: Catch and Bycatch 1998-1999

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Introduction

The shark drift gillnet fishery developed off the east coast of Florida and Georgia in the late 1980's. It became a major fishery about 1990 when more fishers began drift gillnetting for sharks during all times of the year as the king mackerel drift gillnet fishery became further restricted.

Originally, the shark drift gillnet fishery was classified as a Category II fishery (Fox 1990) because it was thought to operate in a fashion similar to the swordfish drift gillnet fishery. However, since 1993 a total of 3 interactions (2 *Caretta caretta*, 4 *Tursiops truncatus*) with protected resources have occurred in 72 observed net sets in the shark drift gillnet fishery at various times of the year (Trent et al. 1997; Carlson and Lee, 1999). Because of the concerns by the NMFS Atlantic and Gulf of Mexico Stock Assessment Review Group and the re-initiation of the Biological Opinion issued under Section 7 of the Endangered Species Act, further observation of this fishery was required. Additionally, in 1999 a revised Fishery Management Plan for Highly Migratory Species (HMS-FMP) established a 100% observer coverage requirement for this fishery at all times to improve estimates of catch, effort, bycatch, and bycatch mortality. Because information on catch and bycatch for this fishery has been reported during the right whale season (15 Nov-31 Mar) (Carlson and Lee, 1999), the objectives of this report are to describe the catch and bycatch in the shark drift gillnet fishery outside the right whale season for 1998 and 1999.

Methods and Materials

Methods as described by Carlson and Lee (1999) were employed. The observer was placed in a position similar to that reported for the swordfish drift gillnet fishery (Cheryl Ryder, NEFSC-Woods Hole, MA; personal communication). Observers in the swordfish drift gillnet fishery record incidental take of sea turtles and also record fall-out of sea turtles in the net from the position where they are stationed. Because of the similarities of the swordfish drift gillnet fishery to the shark drift gillnet fishery and the location of the observer's position on deck, if fall-out did occur, observers would also be in a position to record this information.

Observations were made as the net was hauled aboard. The observer remained about 3-8 m forward of the net reel in an unobstructed view and recorded species, numbers and lengths (± 30 cm) of sharks and other species caught as they were suspended in the net just after passing

over the power roller. When species identification was questionable, the crew stopped the reel so that the observer could examine the animal(s). The weight of each shark was estimated through length-weight relationships provided in Castro (1993), Kohler et al. (1995), Castro (1996), and Carlson (unpublished data). Disposition of each species brought onboard was recorded as kept, discarded alive, or discarded dead. Data were submitted to the SEFSC Sustainable Fisheries Division on a weekly basis. The data were entered by SEFSC staff, examined by NMFS SEFSC Sustainable Fisheries Division staff, and reviewed with Johnson Controls contract staff to resolve any questions.

NMFS-approved contract observers were placed at various field locations from 2 June-30 September. Observers usually remained on site for up to 2 months depending on funding and activity level of the fishery. Normally, the observer left port with the vessel between 1800-2300 hrs; depending on distance to the fishing grounds, and returned the following morning. For each set and haul of the net observers recorded: beginning and ending times of setting and hauling; estimated length of net set; sea and wind states; latitude and longitude coordinates; and water depth.

Observed fishing effort occurred in four major areas: between Catherines Sound, GA and Doboy and Altamaha Sound, GA (~31° 20-45' N); Cape Canaveral, FL (~28° 20-50' N); Ft. Pierce, FL (~27° 51' N); and Mayport, FL (~30° 30-50' N) (Figure 1).

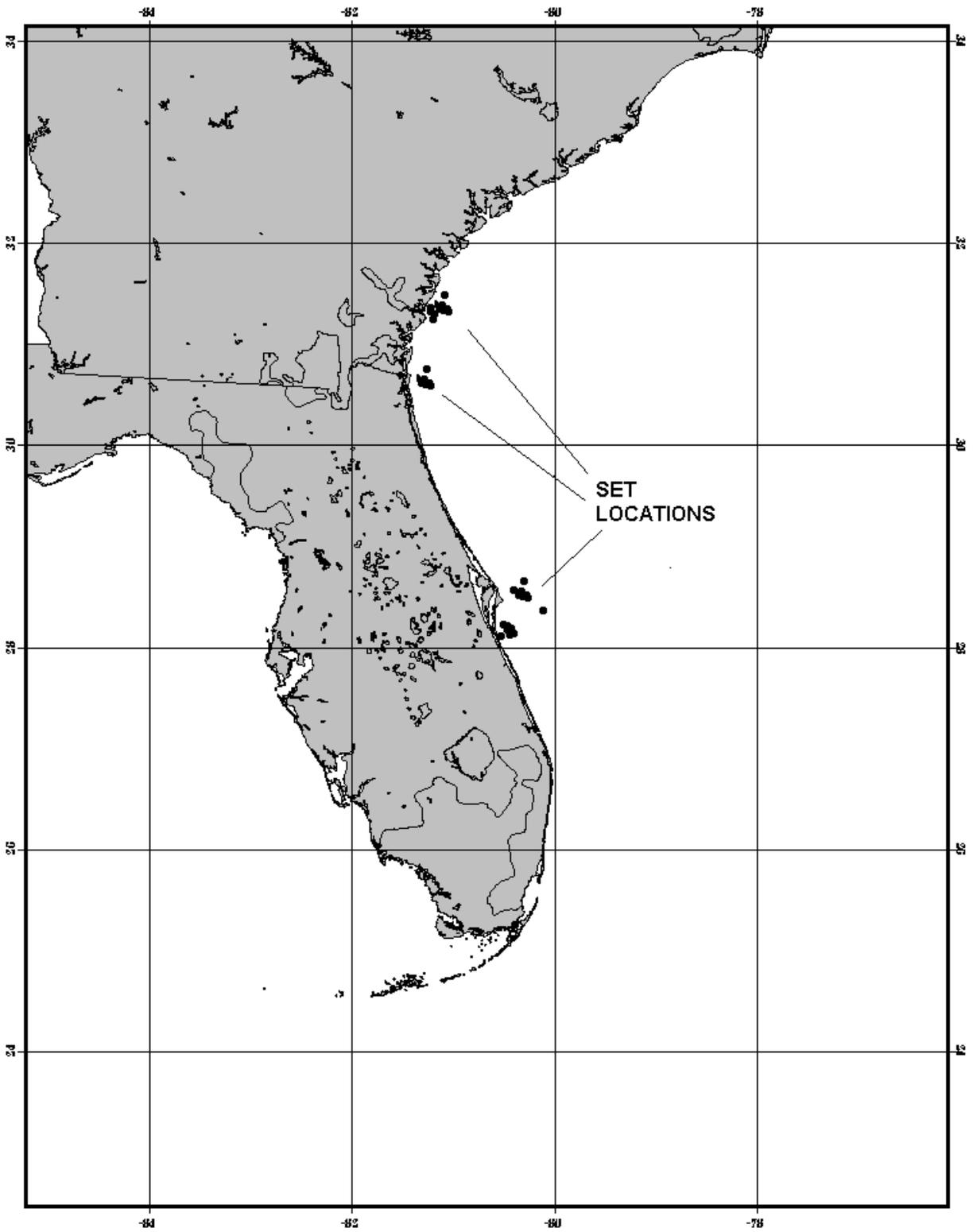


Figure 1. Distribution of fishing locations in 1998 and 1999 outside the right whale season.

Gillnets were set at least 4.8 km offshore in Exclusive Economic Zone (EEZ) waters outside of state jurisdiction. Shark drift gillnets were set in waters ranging from 3.0-30.7 m deep over bottoms with no known obstructions, and on outgoing tides to prevent the gillnet from drifting into state waters when set near inlets.

Results and Discussion

A total of 42 sets on 40 vessel trips (9 sets in 1998 and 33 sets in 1999) were observed from 2 June-30 September 1998 and 1999. The known number of vessels in the shark drift gillnet fishery fishing off Florida and Georgia was 7 with an average of 5.7 trips per boat.

Trips in the shark drift gillnet fishery varied by vessel in crew size, duration, and length of sets. Nets ranged in length from 820.8-2,462.4 m with the most frequently used length of 1824 m. The depths of the nets ranged from 9.1-22.8 m and mesh sizes, from 9.0-22.5 cm. Generally, vessels fishing off Georgia used larger mesh sizes while those off central Florida used smaller meshes due to targeting of large coastal shark species over small coastals. Usually only one set was made per night beginning around 2200 hrs. Set duration averaged 0.35 hrs (± 0.12 S.D.). Haulback usually began about 0600 hrs (range=0200-08.67 hrs). Net retrieval and processing averaged 3.8 hrs (± 1.78 S.D.). The net was inspected at various occasions during the soak, and then hauled onto the vessel when the captain/crew felt the catch was adequate. Average soak time for the driftnet (time net was first set minus time haulback ended) was 9.9 hrs (± 4.1 S.D.).

An estimated 13,692 animals were caught on all observed trips. The catch consisted of 12 species of sharks and 32 species of teleosts and rays. Total observed catch composition (percent of numbers caught) was 92.2% sharks, 6.8% teleosts, and 1.0% rays. No sea turtles or marine mammals were observed captured (Figure 2). Four species of sharks made up 95.0% by number (Figure 3) and 87.6% by weight (Figure 4) of the observed shark catch. These species were the Atlantic sharpnose shark, *Rhizoprionodon terraenovae*; blacknose shark, *Carcharhinus acronotus*; blacktip shark, *C. limbatus*; and bonnethead, *Sphyrna tiburo*.

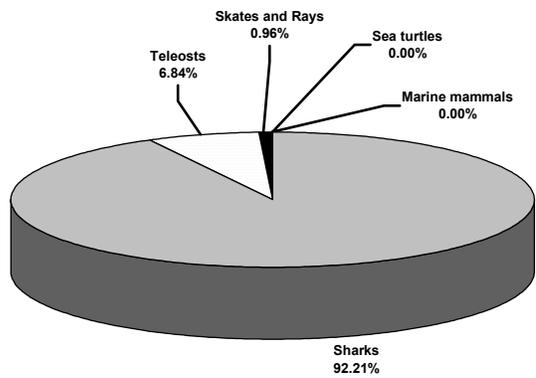


Figure 2. Observed total catch composition (percent of numbers caught) of species caught outside the right whale season.

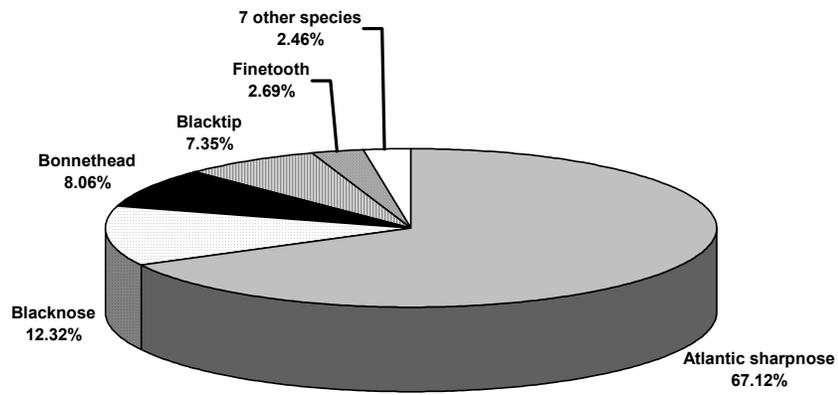


Figure 3. Observed total shark catch composition (percent of numbers caught).

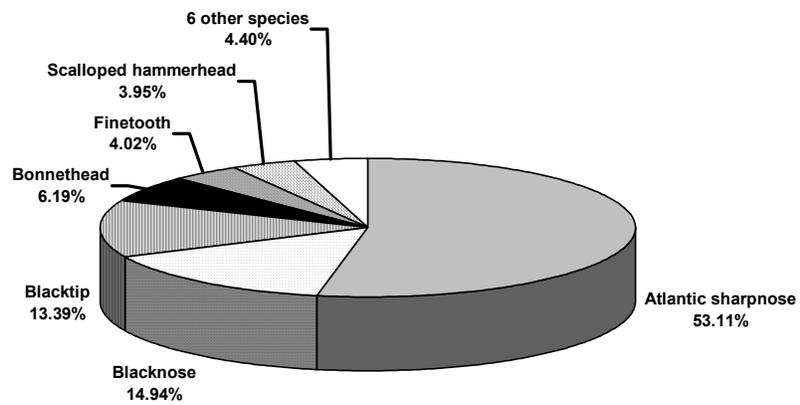


Figure 4. Observed total shark catch composition (percent of weight caught).

Using the estimated lengths (± 30 cm) of each shark observed caught, predicted average weights for sharks based on length-weight relationships are as follows:

Common name	Year	Ave weight (kg)	n	Year	Ave weight (kg)	n
Blacknose	99	4.7	1518	98	5.1	38
Spinner	99	10.8	175	98	7.3	2
Finetooth	99	5.8	339	98	3.8	1
Bull	99	56.8	2	98		
Blacktip	99	7.1	892	98	4.1	36
Sand tiger	99	73.5	1			
Tiger	99	2.0	2			
Atlantic sharpnose	99	3.0	5981	98	3.1	2493
Scalloped hammerhead	99	24.5	43	98	10.6	82
Great hammerhead	99	4.4	1			
Bonnethead	99	3.2	874	98	1.6	143

Seven species of teleosts and rays made up 90.2% by number of the overall non-shark species (Figure 5). The bycatch was dominated by little tunny, *Euthynnus alletteratus*; king mackerel, *Scomberomorus cavalla*; cownose ray, *Rhinoptera bonasus*; crevalle jack, *Caranx hippos*; great barracuda, *Sphyraena barracuda*; cobia, *Rachycentron canadum*; and tarpon, *Megalops atlanticus*.

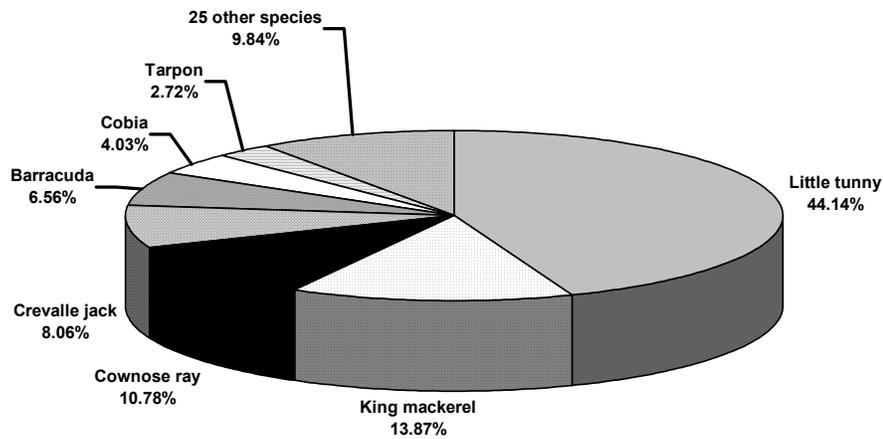


Figure 5. Observed bycatch composition (percent of numbers caught).

Disposition of Catch

Portions of both the targeted catch (sharks) (Table 1) and incidental catch (Table 2) were discarded. The proportions discarded varied among target and incidental catch. In the targeted catch, the highest amount discarded dead was for blacktip shark (28.8%), scalloped hammerhead shark (20.8%) and spinner shark (5.6%). Applying species-specific length-weight relationships, total whole weight dead discards are 1943.4 kg for blacktip, 506.3 kg for scalloped hammerhead, and 37.6 kg for spinner shark in 1999. No observed dead discards were observed in 1998 due to a smaller sample size and that most trips were observed when the large coastal season was open. Using estimates of the annual trips made (outside the large coastal season), predictions of annual whole weight dead discards of large coastal species are about 11,305.0 kg and 6,770.0 kg for 1998 and 1999, respectively. Dead discards were least for blacknose (0.0%) and Atlantic sharpnose sharks (0.3%). In most cases, shark bycatch was discarded due to the lower quality of flesh and lower market value among the larger hammerheads. Blacktip and spinner shark discards were related to fishing activity that occurred during the large coastal season closure.

For sets observed off Georgia, discards are also thought to be related to new size regulations on large coastal species imposed by the state of Georgia.

For incidental catch species, the highest proportion discarded dead (with observed catch greater than 10 specimens) was for tarpon (75.9%), crevalle jack (73.3%), and little tunny (53.7%). The lowest proportion discarded dead was for Atlantic bonito (0.0%) and great barracuda (1.4% total). Cownose rays had the highest discard proportion alive, 73.0%.

Table 1. Total shark catch by species and species disposition in order of decreasing abundance during all observer trips in 1998 and 1999.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	8474	99.6	0.1	0.3
<i>Carcharhinus acronotus</i>	Blacknose	1556	100.0	0.0	0.0
<i>Sphyrna tiburo</i>	Bonnethead	1017	98.5	0.4	1.1
<i>C. limbatus</i>	Blacktip	928	63.0	8.2	28.8
<i>C. isodon</i>	Finetooth	340	99.7	0.0	0.3
<i>C. brevipinna</i>	Spinner	177	93.2	1.1	5.6
<i>S. lewini</i>	Scalloped hammerhead	125	76.8	2.4	20.8
<i>C. leucas</i>	Bull	2	100.0	0.0	0.0
<i>Galeocerdo cuvieri</i>	Tiger	2	50.0	50.0	0.0
<i>Negaprion brevirostris</i>	Lemon	2	0.0	50.0	50.0
<i>Carcharias taurus</i>	Sand tiger	1	0.0	100.0	0.0
<i>S. mokarran</i>	Great hammerhead	1	0.0	0.0	100.0

Table 2. Total bycatch caught by species in order of decreasing abundance and species disposition during all observer trips in 1998 and 1999.

Species	Common name	Total number caught	Kept (%)	Discard Alive (%)	Discard Dead (%)
<i>Euthynnus alletteratus</i>	Little tunny	471	46.1	0.2	53.7
<i>Scomberomorus cavalla</i>	King mackerel	148	47.3	2.0	50.7
<i>Rhinoptera bonasus</i>	Cownose ray	115	20.8	73.0	6.2
<i>Caranx hippos</i>	Crevalle jack	86	18.6	8.1	73.3
<i>Sphyraena barracuda</i>	Great barracuda	70	98.6	0.0	1.4
<i>Rachycentron canadum</i>	Cobia	43	53.5	9.3	37.2
<i>Megalops atlanticus</i>	Tarpon	29	0.0	24.1	75.9
<i>Bagre marinus</i>	Gafftop catfish	21	19.0	66.6	14.4
<i>Scomberomorus maculatus</i>	Spanish mackerel	13	53.8	0.0	46.2
<i>Sarda sarda</i>	Atlantic bonito	10	80.0	20.0	0.0
<i>Dasyatis sabina</i>	Atlantic stingray	9	0.0	100.0	0.0
<i>Aetobatus narinari</i>	Spotted eagle ray	7	0.0	85.7	14.3
<i>Remora remora</i>	Remora	6	0.0	0.0	100.0
<i>Paralichthys spp.</i>	Flounder	5	40.0	40.0	20.0
<i>Chaetodipterus faber</i>	Spadefish	5	20.0	20.0	60.0
<i>Lutjanus griseus</i>	Gray snapper	5	100.0	0.0	0.0
<i>Sciaenops ocellatus</i>	Red drum	3	0.0	100.0	0.0

<i>Micropogonias undulatus</i>	Atlantic croaker	2	0.0	0.0	100.0
<i>Aluterus moncerus</i>	Unicorn filefish	2	0.0	100.0	0.0
<i>Istiophorus platypterus</i>	Atlantic sailfish	2	0.0	0.0	100.0
<i>Selene septapinnis</i>	Atlantic moonfish	2	0.0	0.0	100.0
<i>Seriola rivoliana</i>	Almaco jack	2	50.0	0.0	50.0
<i>Thunnus atlanticus</i>	Blackfin tuna	2	100.0	0.0	0.0
<i>Diodon hystrix</i>	Porcupinefish	1	0.0	0.0	100.0
<i>Acanthocybium solanderi</i>	Wahoo	1	100.0	0.0	0.0
<i>Alectis ciliaris</i>	African pompano	1	100.0	0.0	0.0
<i>Cantherines macrocerus</i>	Whitespotted filefish	1	0.0	100.0	0.0
<i>Lobotes surinamensis</i>	Tripletail	1	0.0	0.0	100.0
<i>Manta birostris</i>	Atlantic manta ray	1	0.0	100.0	0.0
<i>Pomatomus saltatrix</i>	Bluefish	1	0.0	0.0	100.0
<i>Trachinotus falcatus</i>	Permit	1	0.0	0.0	100.0
<i>Trachinotus carolinus</i>	Pompano	1	0.0	0.0	100.0

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